

L140.031



PATENT SPECIFICATION

DRAWINGS ATTACHED

L140.031

Inventors: DAVID EDWARD DAVIES and
THEODORE STEELE

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COMPLETE SPECIFICATION

Dispenser for Injecting Liquid into a Flushing or like Cistern

I, DAVID EDWARD DAVIES, a British Subject of 38 Newcastle Street, Crewe, Cheshire, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns dispensers and has for its object the provision of a dispenser for injecting small quantities of liquid into water contained in the flushing cistern of a water closet or a like periodical filling and emptying receptacle (hereinafter referred to as a "cistern" for the sake of convenience).

With this object in view, the present invention provides a dispenser for injecting small quantities of liquid into a flushing or like cistern as the cistern fills or empties, comprising a container for the liquid and the only outlet from which is a restricted outlet at or near the bottom thereof such that the liquid will not flow therethrough under gravity, and a float which moves up and down as the cistern fills and empties, said float being associated with the container such that said up-and-down movement of the float is utilized to vary the volume of the container to effect pumping of a small quantity of liquid through said restricted outlet once each cycle during which the cistern fills and empties.

In a preferred arrangement the float is in the form of an inverted cup in which air becomes trapped upon filling of the cistern, and in one practical embodiment such float is connected to a piston rod which extends upwardly into the container, raising and lowering of the float varying the amount of such rod disposed within the container, and thereby varying the effective volume thereof.

The dispenser is preferably provided with a downwardly extending externally threaded neck, and an inverted internally threaded screw cap arranged to be threadably secured to the neck. The screw cap is provided with

a central inwardly directed boss which has a central bore through which the piston rod extends.

Conveniently, the piston rod is a slack sliding fit within the boss so as to define between itself and the boss the restricted outlet. Thus, it will be appreciated that movement of the piston rod vertically with respect to the container will vary the effective internal volume of such container.

Alternatively, the piston rod may be a close sliding fit within the boss, there being a longitudinal groove formed in the piston rod or in the bore defined by the boss.

As a further alternative the restricted outlet may comprise a small aperture or apertures in the screw cap itself. The float may also be in the form of a block of material which is less dense than water. In order to prevent undue leakage of the liquid from the container into the cistern the float, which is connected to the lower part of the piston rod, is provided with a dished washer, which, when the float is in its uppermost position, abuts the screw cap, to close the restricted outlet, and thus seal off the container.

In a preferred form the dispenser has means whereby the dispenser may be secured in an appropriate position inside the cistern, whereby the screw cap is disposed in a position whereat it is totally immersed when the water in the cistern reaches its usual maximum level.

The invention also provides a cistern having a dispenser of the type described, and in one preferred embodiment the container is formed integrally with one wall of the cistern, the screw cap being positioned so as to be just totally immersed in the water when the water is at its maximum usual level. In this embodiment, the container is provided with a hermetically closable aperture in an upper end thereof in order that the container may be filled and refilled with the liquid to be in-

[Price 4s. 6d.]

jected into the water in the cistern.

Embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings, wherein:—

Fig. 1 is a diagrammatical perspective view of a dispenser according to the invention secured within a cistern;

Figs. 2 and 3 show, in enlarged vertical section, alternative forms of outlet arrangements of the dispenser;

Figs. 4 and 5 are sectional views taken along the lines IV—IV and V—V of Figs. 2 and 3 respectively;

Fig. 6 shows, partly in section, a further form of outlet arrangement;

Fig. 7 shows the dispenser in a form ready for packaging;

Fig. 8 shows a second embodiment of the dispenser; and Fig. 9 is an enlarged sectional view corresponding to the line IX—IX of Fig. 8.

As shown in Figs. 1 to 7 a dispenser, constructed in accordance with this invention, comprises a broad but shallow container 10 having an externally threaded neck 11 extending downwardly from a base 12 thereof, and an inverted internally threaded screw cap 13 threadably secured to the neck 11. The screw cap 13 is provided with a central inwardly directed boss 14 which has a central bore through which a piston rod 15 extends. The upper end of the piston rod 15 is provided with a head 16 of larger diameter than the bore, in order to prevent the piston rod 15 from being withdrawn downwardly through and out of the bore. The lower end of the piston rod 15 is provided with a float 17, which will be hereinafter described. The piston rod 15 may be a slack fit into the central bore so as to define between itself and the bore a restricted outlet for the container.

In the embodiment shown in Figs. 2 and 4 a restricted outlet is provided by a slot 18 in the wall of the bore, and in the embodiment shown in Figs. 3 and 5 the restricted outlet is provided by a slot 19 in the piston rod 15 itself, and in both embodiments the piston rod 15 is a close sliding fit in the bore.

The float 17 is in the form of a substantially cylindrical body, having an open lower end 20 and a closed upper end 21. In an alternative embodiment the float 17a is of closed form as shown in Fig. 6. Turning again to Figs. 2 and 3, the lowermost end of the piston rod 15 is secured axially to the closed end 21 of the float 17. A dished washer 22 is provided around the lower end of the piston rod 15, above and adjacent the closed end 21 of the float 17.

The container 10 is in the form of an inverted rectilinear bottle of synthetic plastics material, an upper horizontal end 23 of which is provided with three horizontal open-ended

slots 24, 25, 26 into which mounting means is engaged. As shown in Figs. 1 and 7 the mounting means comprises three L-shaped resilient synthetic plastics elements 27 of a section commensurate with the section of the open-ended slots 24 to 26.

In the packaged condition the elements 27 are secured to one corner of the container 10 by adhesive tape as shown in Fig. 7, and the cap 13, piston rod 15 and float 17 or 17a are similarly secured to the container 10 adjacent the elements 27.

In the alternative embodiment shown in Figs. 8 and 9 the container 10 is provided with three headed studs 28 which extend outwardly from a rear side 29 of the container 10, and which are spaced apart and in horizontal mutual alignment.

The studs 28 are arranged so as to be a push fit into a respective horizontal row of the holes 30 provided in a mounting means for the dispenser.

The mounting means comprises a sheet 31 of synthetic plastics material which is bent so as to be of inverted U-shaped cross-section, there being three rows of the holes 30 provided in that limb 31a of the sheet 30 which forms one wall, namely the rear wall, of the U-shape. The three rows of holes 30 are disposed one above the other.

In use, with the neck 11 uppermost, the screw cap 13 of the dispenser is removed and the container 10 is filled with a liquid to be dispensed into a flushing cistern 32. Then the screw cap 13 is replaced, and the container 10 is inverted so that the screw cap 13 is at the bottom thereof. The mounting means is secured to the container 10 by passing the elements 27 into the slots 24, 25, 26 or by passing the studs 28 into one row of the holes 30, the mounting means is hooked over one wall 33 of the cistern so that the wall 33 of the cistern 32 is disposed between the shorter limbs 34 of the elements 27 and the rear side 29 of the container 10, or between the limbs of the U-shaped sheet 31 with the inner limb 31a thereof being disposed inside the cistern 32. As soon as the cistern 32 has been allowed to fill with water 34A so that the water reaches its usual maximum level in the latter embodiment, the position of the maximum level is noted and the studs 28 are inserted into one of the rows of holes 30, so that the screw cap 13 is positioned or located in a position so as to be just totally immersed below the noted maximum water level.

Subsequently, in all embodiments, when the cistern 32 is emptied the water level will fall and the float 17 or 17a and piston rod 15 will move downwardly, thus increasing the effective available volume within the container 10, and therefore causing air to pass into the container 10 through the restricted outlet. As soon as the water level in the cistern 32 rises again the float 17 or 17a will cause

the piston rod 15 to move upwardly to decrease the effective internal volume of the container 10. This will cause liquid to be forced out of the container 10 through the restricted outlet until the dished washer 22 is brought upwardly, due to the continued upward movement of the float 17 or 17a and piston rod 15, so as to cover the outlet. The closing of the restricted outlet by the dished washer 22 will prevent undue leakage of the liquid into the cistern 10. The amount of liquid injected into the cistern, will, of course, depend on the amount by which the volume of the container 10 is altered during the movement of the piston rod 15. It is important that the screw cap 13 be only reasonably immersed, because, if the screw cap 13 is immersed too deeply within the water, when the usual amount of the water is expelled from the cistern, the float will not be allowed to move downwardly and hence no liquid will be injected into the cistern on subsequent refilling thereof.

The invention is not confined to the precise details of the foregoing example, and variations are possible within the scope of the invention as defined in the appended claims. For example, the restricted aperture need not be defined between the piston rod and the bore because the piston may be a close sliding fit within the bore, the restricted aperture being defined by a passage made in a lower part of the container 10 e.g. in the wall of the boss which defines the bore. Any suitable form of cap may be provided e.g. the cap may be in the form of a socket into the container or resiliently grip a neck of the container. It will be appreciated that the size of the restricted outlet will be in proportion to the amount of liquid to be injected into the cistern and in proportion to the viscosity of such liquid. Also, the restricted outlet may be further restricted by means of a flap valve or the like during the descent of the piston rod, as air is, of course, substantially less viscous than liquids which are to be injected into the water in the cistern. An example of such liquid comprises approximately one to ten parts by weight of sodium - hexa - metaphosphate, approximately one to five parts by weight of ethylene - diamine - tetra - acetic acid, or a salt thereof or an equivalent compound thereto in function, one to five parts of anionic secondary alkyl-sulphate or an equivalent compound thereto in function, and one to ten parts of alkyl-aryl-sulphonate or an equivalent compound thereto in function, by weight, dissolved in ten to fifty parts by weight of water.

One specific form of the cleansing liquid is prepared by mixing together the substances shown in Table I, which table also gives the percentage by weight of each substance together with an approximate indication of the usual general function of each substance.

TABLE I

Substance	Percentage of the total amount of the cleansing liquid	General usual function of the substance
1. sodium-hexa-metaphosphate	8%	water softening agent
2. ethylene-diamine-tetra-acetic-acid	4%	metal sequestering agent
3. anionic secondary alkyl-sulphate	2%	wetting agent
4. alkyl-aryl-sulphonate	8%	detergent agent
5. water	78%	solvent

It has been found that the use of two detergents is to be preferred because the alkyl aryl-sulphonate has a tendency to produce large amounts of foam, and to settle out of the cleansing liquid. The addition of the secondary alkyl-sulphate reduces the tendency to settle out and reduces the amount of foam produced, whilst improving the overall performance of the cleansing liquid.

Although the example given in Table I is an optimum example of general formulation of the cleansing liquid, it has been found that satisfactory cleansing liquids are produced provided that the various substances are generally kept within the tolerances illustrated in Table II.

TABLE II

Substance	Percentage of substance
1. sodium-hexa-meta-phosphate	1% to 20%
2. ethylene-diamine-tetra-acetic acid	$\frac{1}{2}$ % to 10%
3. anionic secondary alkyl-sulphate	$\frac{1}{2}$ % to 10%
4. alkyl-aryl-sulphonate	4% to 30%
5. water	to make up to 100%

Various alternative substances may be used instead of ethylene - diamine - tetra - acetic acid, in particular such metal sequestering agents as sodium gluconate or other suitable salt of gluconic acid, or nitrylo - tri - acetic acid or a suitable salt thereof, or sodium silicate.

It is to be understood that the ethylene-diamine - tetra - acetic acid will usually be used in the form of a suitable salt thereof because the actual acid as such is only sparingly soluble, the alkali metal salts thereof being far more soluble than the actual acid.

The anionic secondary alkyl sulphate used in a preferred embodiment is "Perlankrol O", manufactured by Lankro Chemicals Limited, which is a 25% aqueous solution of sodium octyl sulphate. However, it has been found that several other sulphates of general formula RSO_4X may be used, wherein R is an alkyl group containing approximately six to eighteen carbon atoms, and wherein X is an alkali metal, an ammonium or an ethanolamine group.

It has also been found that any alkyl aryl sulphonate having the general formula $RC_6H_4SO_3X$ may be used, wherein R is an alkyl group containing ten to eighteen carbon atoms, and wherein X is an alkali metal, ammonium or ethanolamine group. A perfume and/or disinfectant may be added to the liquid.

The float may be a hollow totally - closed body, containing air or a substance which is less dense than water, or, if the float is a material which is less dense than water, it may comprise a solid block of such material.

The container may be of any suitable shape or size, but it has been found with usual domestic water-closet systems that a container holding eight to ten fluid ounces is most suitable. Such a container is preferably provided with a restricted outlet defined between the piston rod and the bore, the clearance therebetween being approximately 0.01 of an

inch. The container may also be provided with a further screw cap and neck arrangement, of usual form, in the upper surface thereof, in order that the container may be refilled with liquid without necessitating the removal of the container from the cistern. Also, the container may be weighted at a lower part thereof to increase the stability of the container, and the rear side of the container may be convexly curved.

The mounting means may be of any practical form, for example, it may comprise a half inch wide strip of synthetic plastics material bent to form a U-shape, there being a vertical slot provided in the rear or corresponding wall of the container, so that when the U-shape is hooked over a wall of the cistern, the inner limb of the U-shape may be pushed into the slot to an extent sufficient to hold the container in the necessary position as hereinbefore defined.

Furthermore, it is also possible to provide a cistern having a modified wall which is hollow, and shaped so as to define or provide a container for the liquid. Such container, integral with the cistern, is provided with a neck, screw cap, piston rod and float assembly, as hereinbefore described, in a lower or base wall thereof, and is provided with a hermetically closable filling aperture in an upper wall thereof, in order that the container may be filled with the liquid.

This arrangement of course dispenses with the need for a mounting means, and, of course, when correctly designed, will ensure that the dispenser is always in a correct position with respect to the usual maximum level of the water in the cistern.

Other minor variations are possible, for example, the container could be of glass, metal or any other suitable material. Also, the elements 27 may be made of a flexible non-resilient metal such as brass, so that they may be bent over at that end which, in use, is remote from the wall of the cistern, to force

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the dispenser into firm contact with said wall to prevent the dispenser being moved as the cistern flushes and fills with water.

WHAT I CLAIM IS:—

- 5 1. A dispenser for injecting small quantities of liquid into a flushing or like cistern as the cistern fills or empties, comprising a container for the liquid and the only outlet from which is a restricted outlet at or near the
- 10 bottom thereof such that the liquid will not flow therethrough under gravity, and a float which moves up-and-down as the cistern fills and empties, said float being associated with the container such that said up and down
- 15 movement of the float is utilized to vary the value of the container to effect pumping of a small quantity of liquid through said restricted outlet once each cycle during which the cistern fills and empties.
- 20 2. A dispenser as claimed in claim 1 wherein the float is in the form of an inverted cup.
3. A dispenser as claimed in claim 1 or 2 wherein the float is connected to a piston rod which extends into the container.
- 25 4. A dispenser as claimed in claim 3 wherein the piston rod extends slidably through a cap which is releasably securable to the container.
5. A dispenser as claimed in claim 4
- 30 wherein the cap is threadably connectable to a neck of the container.
6. A dispenser as claimed in claim 4 or 5 wherein the restricted outlet is defined between the cap and the piston rod.
- 35 7. A dispenser as claimed in any preceding claim wherein a washer, movable with the float, is provided to close or seal-off the restricted outlet when the float moves up by a predetermined amount.
- 40 8. A dispenser as claimed in any preceding claim wherein mounting means are provided to enable the dispenser to be secured to one wall of a cistern.
9. A dispenser as claimed in claim 8 where-

in the mounting means comprises a U or L-shaped element securable into a slot provided in the container. 45

10. A dispenser as claimed in claim 8, wherein the mounting means comprises a perforate U-sectioned sheet, there being studs on the container securable into holes provided in the sheet. 50

11. A dispenser as claimed in any preceding claim comprising a stiff resilient synthetic plastics material. 55

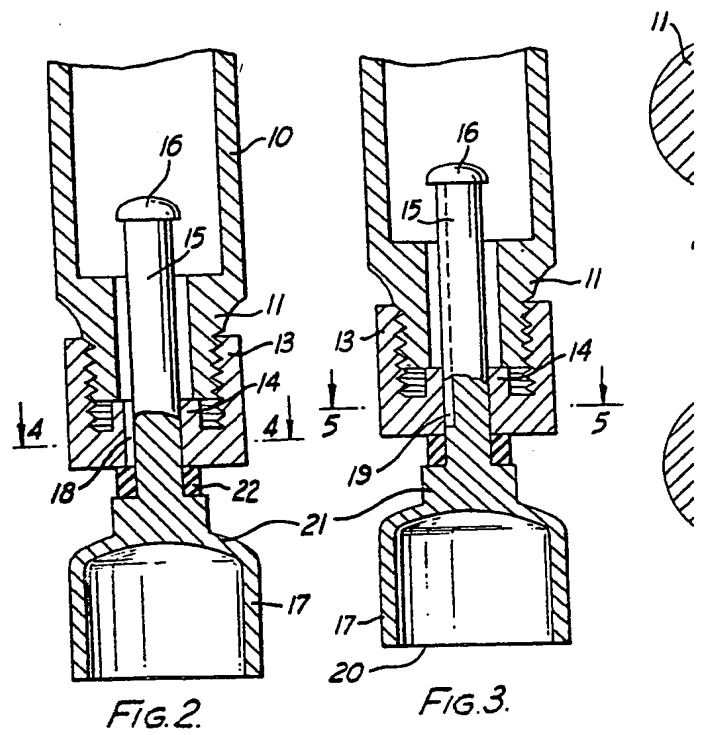
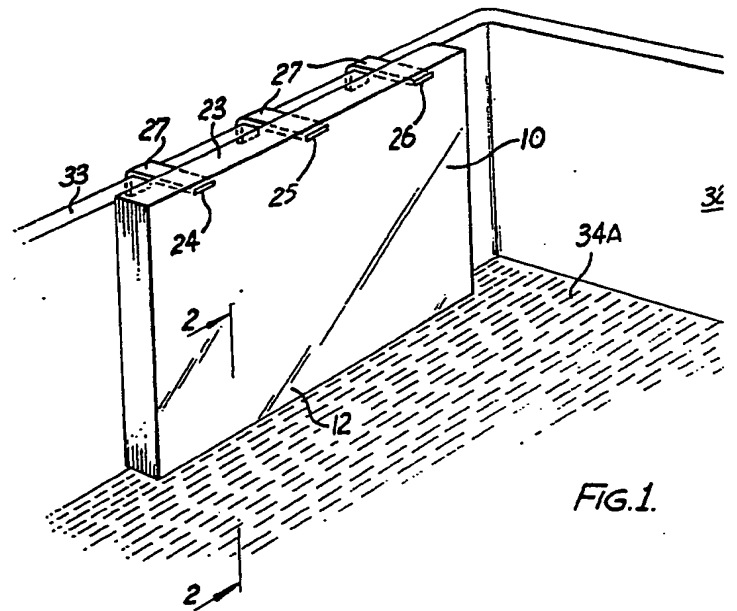
12. A dispenser substantially as hereinbefore described with reference to and as illustrated in Figs. 1 and 7 or Figs. 8 and 9; or Figs. 1 and 7 or Figs. 8 and 9 as modified by Figs. 2 and 4 or Figs. 3 and 5 or Fig. 6. 60

13. A cistern incorporating in itself a dispenser as claimed in any of claims 1 to 7 and including a hermetically sealable filler aperture.

14. A dispenser as claimed in any of claims 1 to 12, wherein the container contains a liquid comprising approximately one to ten parts by weight of sodium - hexa - meta - phosphate, approximately one to five parts by weight of ethylene - diamine - tetra - acetic acid, or a salt thereof or a compound equivalent thereto in function, one to five parts of anionic secondary alkyl sulphate or a compound equivalent thereto in function, and one to ten parts by weight of alkyl - aryl - sulphate or a compound equivalent thereto in function, by weight, dissolved in ten to fifty parts by weight of water. 75

15. A dispenser as claimed in claim 14 wherein the liquid is comprised as is hereinbefore described with reference to Table I or Table II. 80

Agents for the Applicant,
SYDNEY E. M'CAW & CO.,
Chartered Patent Agents,
"Saxone House", 52—56 Market Street,
Manchester 1.



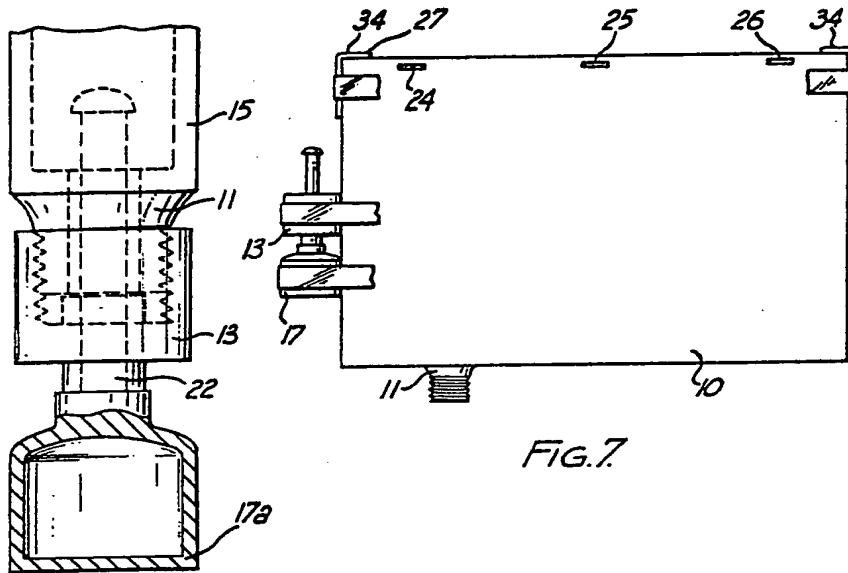


FIG. 7

FIG. 6.

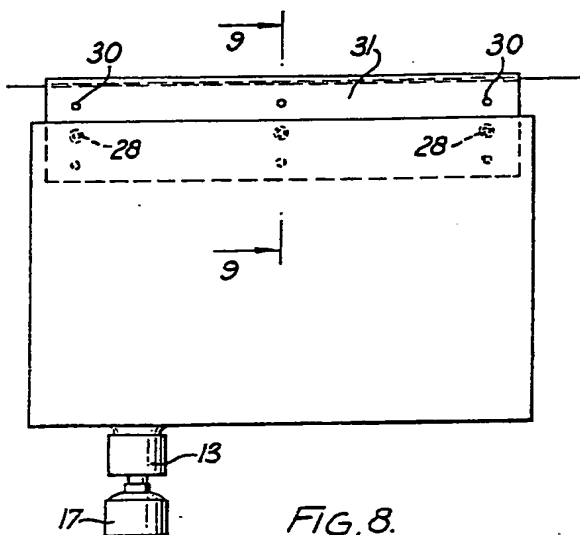


FIG. 8.

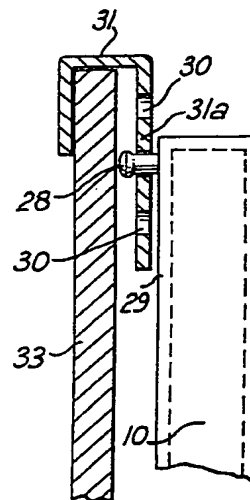


FIG. 9.

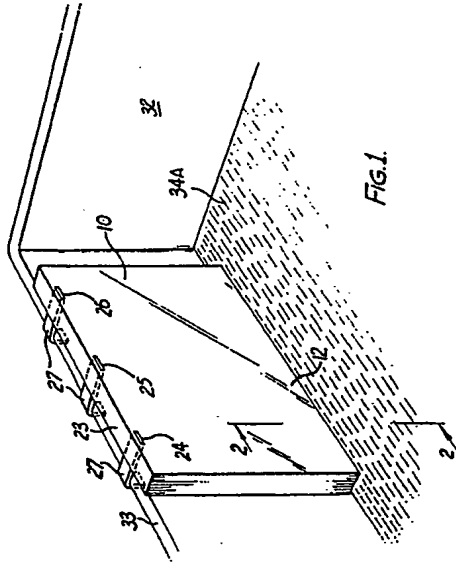


FIG. 1.

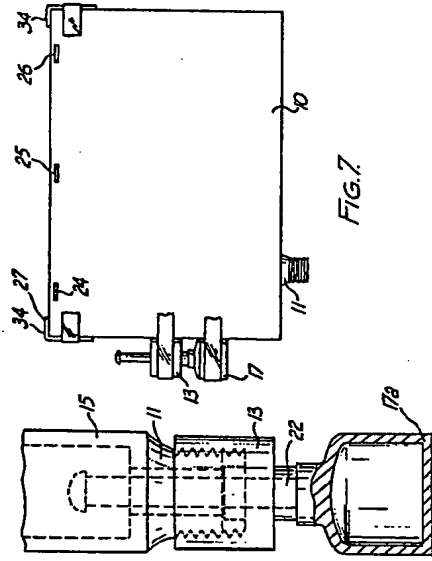


FIG. 7.

FIG. 6.

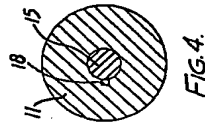


FIG. 4.

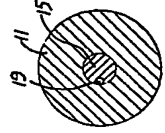


FIG. 5.

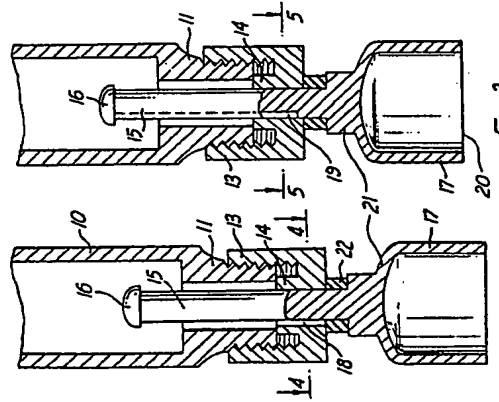


FIG. 2.

FIG. 3.

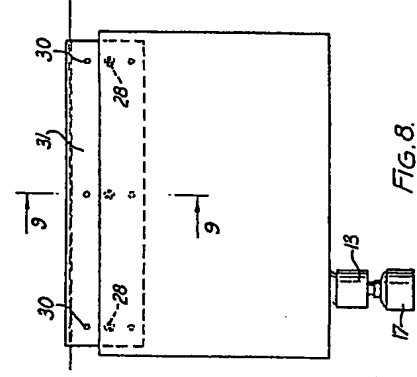


FIG. 8.

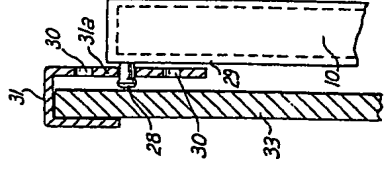


FIG. 9.